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The academic influence of thyroid imaging: a bibliometric perspective in radiology

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ABSTRACT

Aims: Thyroid imaging is an essential component of diagnosing and managing thyroid diseases, including thyroid nodules and thyroid cancer. Various imaging modalities such as ultrasonography (US), Doppler US, computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET/CT) are widely utilized for accurate evaluation and risk stratification. Despite the increasing research activity in thyroid imaging, a comprehensive bibliometric analysis focusing solely on radiology publications has not been conducted. This study aims to perform a bibliometric analysis of thyroid imaging research within the field of radiology, identifying publication trends, highly cited works, leading institutions, collaborative networks, and emerging research areas.

Methods: A systematic bibliometric analysis was conducted using data from the Web of Science (WoS) Core Collection. The search was restricted to radiology-related publications on thyroid imaging between January 2005 and December 2024. VOSviewer (version 1.6.11) was used to map citation networks, keyword co-occurrence, and institutional collaborations. Statistical analyses were performed using SPSS to examine publication growth, citation trends, and thematic clusters.

Results: A total of 4.007 articles were identified. The number of publications has steadily increased over the years, with the highest number of publications recorded in 2024 (317 articles). US remains the dominant imaging technique in thyroid imaging research, whereas PET/CT and MRI are gaining prominence in specific clinical applications. The European Journal of Nuclear Medicine and Molecular Imaging, Clinical Nuclear Medicine, and the Journal of Nuclear Medicine were the most influential journals. Mayo Clinic, Yonsei University, and Duke University emerged as the leading institutions in the field. Keyword analysis revealed major research themes related to thyroid nodules, malignancy risk assessment, ultrasound-guided interventions, and advanced imaging techniques.

Conclusion: The field of thyroid imaging has expanded significantly, with a clear dominance of US in research and clinical applications. However, the increasing role of PET/CT, MRI, and AI-driven imaging technologies indicates a shift towards advanced diagnostic methods. Future research should integrate artificial intelligence (AI) and radiomics into thyroid imaging to enhance diagnostic precision and clinical utility. The findings from this bibliometric analysis provide valuable insights into research trends, influential contributors, and future directions in thyroid imaging within radiology.

Keywords: Thyroid imaging, ultrasonography, thyroid nodules, bibliometric analysis, medical imaging trends

INTRODUCTION

Imaging of the thyroid gland is significant in the evaluation of most thyroid diseases, including the more complex ones like thyroid nodules and thyroid cancer. Diagnostic imaging techniques such as ultrasonography (US), Doppler US, computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET/CT) have been used extensively to improve diagnostic efficacy and to assist clinical decision making.[1] Among these, US remains the primary modality, as it enables in vivo, real-time imaging of the thyroid gland using a non-invasive procedure and has a high diagnostic yield.[2] The implementation of the standardized Thyroid Imaging Reporting and Data System (TI-RADS) and ultrasound-guided fine-needle aspiration (FNA) has further strengthened the role of imaging in classification and assessment of the cancer risk of thyroid nodules.[3,4]

With the advancement of medical fields, the Su, Gao, and Xu triad notes in their article from 2021 that has cited bibliometric analysis as one of the top trending tools that helps in assessing scientific retrieval, its impact, and collaborations around the globe. Many bibliometric investigations have covered different components of thyroid imaging like thyroid ultrasound, thyroid nodules with FNA, and thyroid cancer including its imaging and management codes.[5-7] All these works have been

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performed efficiently; however, most research strives towards certain sub-division, which makes it possible to claim that in-depth bibliometric analysis of thyroid imaging research relevant to radiology does not exist.

Thyroid imaging has become an integral part of the diagnosis, evaluation and follow-up of thyroid diseases and its continuously changing technological aspects are transforming the clinical management. Ultrasound remains the most important and standard method of imaging, especially in the evaluation of thyroid nodules and structural abnormalities, while PET/CT and MRI are used more frequently in selected areas of practice. With the growing interest around the world concerning the field of thyroid imaging, there is a need to perform a bibliometric analysis to examine the research volume, patterns of publications, and the major contributors in this developing area.

This study aims to conduct a comprehensive bibliometric analysis of thyroid imaging research within the radiology field. It will assess publication patterns, citation impact, influential studies, research collaborations, and emerging themes. By mapping the scientific landscape, this analysis seeks to identify key contributors and trends that shape the field of thyroid imaging.

This research is significant as it quantifies academic contributions to thyroid imaging, offering insights for researchers, radiologists, and policymakers. The findings can help identify influential studies, leading institutions, and future research directions. Moreover, this study aims to facilitate clinical applications, technological advancements, and interdisciplinary collaborations in thyroid imaging.

METHODS

Ethical approval was not obtained, as the study is a bibliometric analysis; however, institutional information is available.

This digital analysis was performed with data received from the WoS database Core Collection, where scientists globally publish for peer review. The primary focus of researches was “thyroid imaging” focusing on thyroid’s and thyroid’s disorders published across various platforms from January 2005 to December 2024.

A comprehensive search strategy was implemented using WoS’s advanced search, with the primary keyword being "thyroid imaging" appearing in the title. Additional keywords and search queries were structured using Boolean operators to refine the results. The initial search yielded a broad dataset, which was then filtered using specific inclusion and exclusion criteria. Only articles that could be classified under “radiology” in WoS were selected to narrow the focus.

After applying the classification filter, a total of 4.007 articles were obtained. To further refine the dataset, a secondary screening was performed based on predefined inclusion and exclusion criteria: (1) inclusion of articles that focused primarily on imaging techniques used for thyroid evaluation, (2) exclusion of conference abstracts, letters, editorials, and non-English articles. The filtering process involved analyzing article titles, abstracts, and other MESH-recognizable tags and keywords to ensure relevancy. To be more selective, the process was consolidated to peer-reviewed studies only so that all duplicates and non-contributing papers were omitted. The selection procedure was verified with two independent researchers who checked for discrepancies and resolved them through discussion.

For each of the selected publications, more information was captured, including title, authors, year of publication, journal name, publication’s impact factor, affiliated country, institution, citation count, and some of the keywords. The data extraction process was systematically performed and validated by two independent researchers to ensure consistency and accuracy.

VOSviewer (version 1.6.11, Leiden University, Netherlands) was used for bibliometric mapping and visual analyses. This software could then be employed to study citation networks, keyword relationships, and collaboration patterns. The study attempted to cover the following aspects in detail:

Trends in the number of publications each year.

Breakdown of publications by the journals in which they were published.

Citation activity of major articles.

Networks of co-occurring keywords to find theme clusters.

Network of participants on institutional and country levels that show global collaborations in research of thyroid imaging.

Statistical Analysis

Statistical methods were applied that provide basic features of research citation patterns distribution and journal impact estimators. SPSS was used for estimating the shifts in published volumes and citation numbers alongside the passage of time. Descriptive and inferential statistics were conducted to analyze trends in publication outputs, citation distributions, and the relative impact of different research themes. Mapping the top 150 keyword allows for finding dominant emerging trends and thematic clusters in thyroid imaging. Additionally, statistical significance testing was performed to assess variations across different time periods and research domains.

Collaboration between institutions and countries was studied to determine the integration and concentration of the research activities. The mapping of intra-institutional and interstate scientific collaborations reflects the life of the networking and collaborative activity in thyroid imaging research.

The entire data collection and analysis procedure is depicted in **Figure 1**.

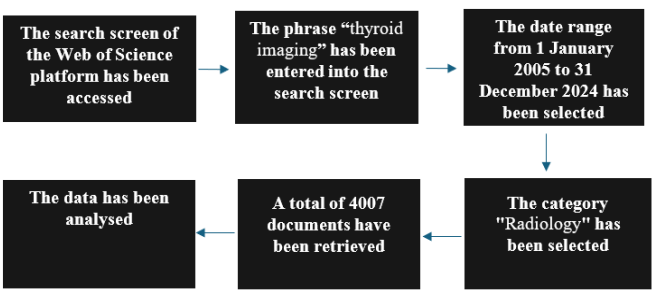
The search screen of the Web of Science platform has been accessed
The phrase “thyroid imaging” has been entered into the search screen
The date range from 1 January 2005 to 31 December 2024 has been selected
The category "Radiology" has been selected
A total of 4007 documents have been retrieved
The data has been analysed

Figure 1. Data collection and analysis procedure

RESULT

Analysis of the Distribution of Articles by Year

The analysis based on Web of Science data presents the distribution of studies on "thyroid imaging" published between 2005 and 2024 (**Figure 2**).

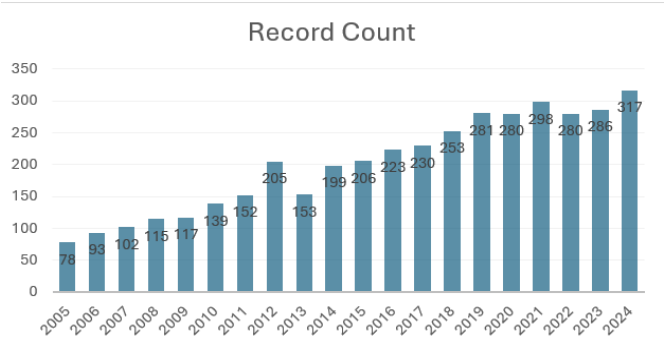

Figure 2. Distribution of articles by year

In the initial years, the number of publications was relatively low. In 2005, 78 studies were published, and a gradual increase was observed until 2010. By 2010, the number of published articles reached 139, and in 2012, a significant increase was noted, reaching 205 articles.

From 2015 onward, a continuous upward trend in publication numbers was observed, reaching 253 articles in 2018 and 281 in 2019. Although there was a slight decline in 2020 (280 articles), the number rose again in 2021, with 298 publications recorded, one of the highest figures in the dataset. In 2022 and 2023, the numbers were 280 and 286 articles, respectively.

The highest number of publications was recorded in 2024, with 317 articles published. This trend suggests that "thyroid imaging" has been gaining increasing academic attention, particularly in recent years, due to advancements in imaging technologies and their widespread use in clinical applications, driving accelerated scientific research in the field.

Leading Academic Journals Publishing on Thyroid Imaging

The distribution of journals that have published the most articles on "thyroid imaging" in the Web of Science database is presented in **Table 1**.

Table 1. Journals in which articles were published, number of publications, and publication rates

Publication titles	Record count	% of 4.007
European Journal of Nuclear Medicine and Molecular Imaging	272	6.78%
Clinical Nuclear Medicine	260	6.48%
Journal of Nuclear Medicine	198	4.94%
Nuclear Medicine Communications	125	3.12%
Journal of Ultrasound in Medicine	102	2.54%
American Journal of Roentgenology	100	2.49%
European Radiology	94	2.34%
Ultrasound in Medicine and Biology	89	2.22%
European Journal of Radiology	88	2.19%
Medical Physics	66	1.64%

According to the analysis, the European Journal of Nuclear Medicine and Molecular Imaging ranked first, publishing 272 articles (6.78%), making it a leading academic platform in the field of thyroid imaging. This indicates that researchers in this area frequently prefer this journal for disseminating their findings.

Clinical Nuclear Medicine ranked second with 260 articles (6.48%), followed by the Journal of Nuclear Medicine with 198 articles (4.94%). These findings highlight that nuclear medicine and molecular imaging journals serve as primary sources for thyroid imaging research.

Other notable journals contributing significantly to the field include:

- Nuclear Medicine Communications (125 articles, 3.12%)
- Journal of Ultrasound in Medicine (102 articles, 2.54%)
- American Journal of Roentgenology (100 articles, 2.49%)
- European Radiology (94 articles, 2.34%)
- Ultrasound in Medicine and Biology (89 articles, 2.22%)
- European Journal of Radiology (88 articles, 2.19%)

Additionally, Medical Physics, which published 66 articles (1.64%), highlights the growing significance of physical modeling and imaging technologies in thyroid imaging research.

Analysis of the Most Cited Studies: Authors, Article Titles, Publishing Journals, Years, and Citation Counts

Table 2 presents a detailed analysis of the most cited studies in the field of thyroid imaging, including author details, journal names, publication years, and citation counts.

The most cited article was published by Tessler et al. (2017) in the Journal of the American College of Radiology, discussing the ACR TI-RADS system and its standardized approach to thyroid nodule assessment. With 1.463 citations, this study has significantly influenced clinical practice by providing a systematic evaluation method for thyroid nodules.

Another highly cited study by Kratochwil et al. (2019) was published in the Journal of Nuclear Medicine, focusing on 68Ga-FAPI PET/CT and its application across various types of cancer. This study, with 971 citations, highlights the effectiveness of next-generation PET/CT techniques in imaging malignancies, including thyroid cancer.

Similarly, the study by Fletcher et al. (2008) received 841 citations, providing recommendations on the use of 18F-FDG PET in oncology. This study sheds light on the role of PET in thyroid imaging processes, emphasizing its relevance in oncological applications.

US-based research on thyroid nodules has also received significant academic attention. The retrospective multicenter study by Moon et al. (2008), which has 821 citations, explored the differentiation of benign and malignant thyroid nodules using ultrasound. Additionally, Kwak et al. (2011) published a study that received 800 citations, evaluating the effectiveness

Table 2. Author information, published journals, publication years, and citation counts of the most cited articles on "thyroid imaging"

No	Author(s)	Article title	Journal name	Publication year	Citation count
1	Tessler FN, et al.	ACR thyroid imaging, reporting and data system (TI-RADS): white paper of the ACR TI-RADS committee	Journal of the American College of Radiology	2017	1463
2	Kratochwil C, et al.	^{68}Ga-FAPI PET/CT: tracer uptake in 28 different kinds of cancer	Journal of Nuclear Medicine	2019	971
3	Fletcher JW, et al.	Recommendations on the use of ^{18}F-FDG PET in oncology	Journal of Nuclear Medicine	2008	841
4	Moon WJ, et al.	Benign and malignant thyroid nodules: US differentiation-multicenter retrospective study	Radiology	2008	821
5	Kwak JY et al.	Thyroid imaging reporting and data system for US features of nodules: a step in establishing better stratification of cancer risk	Radiology	2011	800

of TI-RADS in malignancy risk stratification, further reinforcing the importance of standardized ultrasound reporting systems.

Statistical Evaluation of the Most Cited Institutions in Thyroid Imaging Research

The Web of Science database was used to analyze the institutions affiliated with authors of thyroid imaging research, the number of articles published by these institutions, and the citations received by these publications. **Table 3** presents a detailed breakdown of the most cited institutions, the number of their publications, and their citation counts.

Table 3. Distribution of the most cited institutions and number of publications according to Web of science data

Organization	Documents	Citations
Mayo Clinic	53	4559
Yonsei University	60	4417
Duke University	50	4288
Washington University	34	4134
Johns Hopkins University	44	3709

According to the data, Mayo Clinic stands out as the most influential institution in this field, with 53 publications receiving 4.559 citations. This indicates that Mayo Clinic's research in thyroid imaging has had a significant impact on the literature and has become a key reference for further studies.

Similarly, Yonsei University has published 60 articles, accumulating 4.417 citations, demonstrating its strong research output and academic influence in this domain. Duke University ranks third, with 50 publications and 4.288 citations, highlighting its substantial contributions to thyroid imaging research.

Washington University and Johns Hopkins University also hold prominent positions, with 34 publications receiving 4.134 citations and 44 publications receiving 3.709 citations, respectively. Despite publishing fewer articles than some other institutions, these universities have achieved high citation counts, indicating that their research is widely recognized and frequently referenced within the academic community.

Overall, the most cited institutions are among the world's leading medical schools and research centers, reflecting their substantial contributions to thyroid imaging techniques. These findings suggest that thyroid imaging research is largely driven by prestigious academic institutions that set the direction for advancements in this field.

Relational Distribution of Keywords in Scientific Literature

The most frequently used keywords in "thyroid imaging" research within the Web of Science database, along with their occurrence frequencies, are presented in **Figure 3**.

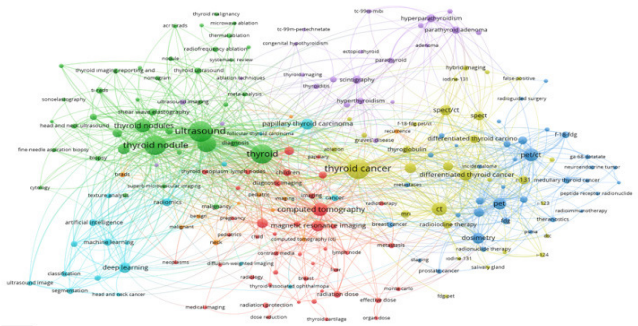

Figure 3. Most frequently used keywords and their usage distribution

Bibliometric analysis was conducted using VOSviewer software, with a minimum threshold of 10 occurrences for keyword selection. This threshold ensures that only keywords used at least 10 times were included in the analysis, allowing the study to focus on more widely used and scientifically meaningful terms. Although 6.339 different keywords were identified in the dataset, only 200 met this threshold and were considered in the evaluation. This method ensures that the analysis is concentrated on established keywords and their interrelationships.

The analysis results reveal the most frequently used keywords and their strongest associations within the research field. A total of 2.867 connections were identified among the keywords, which were grouped into seven distinct clusters. These findings allow for a detailed examination of keyword relationships within the field, enhancing the understanding of terminology and identifying critical concepts for future research.

Figure 3 visualizes the most commonly used keywords and their interconnections in academic publications on thyroid imaging. The terms "thyroid cancer" (142 connections) and "thyroid" (137 connections) have the strongest links,

indicating that research in this field is predominantly focused on the diagnosis and evaluation of thyroid cancer.

The widespread use of "ultrasound" (123 connections) and "US" (106 connections) confirms that ultrasound remains the primary imaging modality for diagnosing thyroid diseases. Similarly, the frequent occurrence of "thyroid nodule" (113 connections) highlights the significance of nodule classification and malignancy risk assessment in thyroid imaging research.

Additionally, the keyword "CT" (90 connections) underscores the role of advanced imaging techniques, particularly in cases where malignancy is suspected. These findings provide a clear picture of the fundamental concepts and terminology shaping the scientific discourse in thyroid imaging.

Analysis of Institutional Collaborations in Thyroid Imaging Research

The institutions publishing research on thyroid imaging and their collaboration networks were analyzed, and the results are visually represented in **Figure 4**.

Figure 4. Bibliometric network visualization of inter-institutional collaboration

In the VOSviewer analysis, colors represent thematic or regional groups, while connections indicate collaborations between institutions. The thickness of these connections reflects the intensity of collaboration. This visualization highlights leading institutions in the field of thyroid imaging and helps identify strong academic networks and potential collaboration opportunities.

The analysis identified University of Ulsan and Mayo Clinic as the most collaborative institutions, with 30 connections each. This indicates that these two institutions have established extensive academic networks and contributed significantly to joint research publications in thyroid imaging.

Other highly collaborative institutions include:

- Sungkyunkwan University (24 connections)
- Shanghai Jiao Tong University (18 connections)
- Universität Duisburg-Essen (15 connections)

These institutions have formed strong research partnerships with specific groups and hold significant positions in the global academic network. Notably, the strong collaborations between Asian and European institutions suggest that the field of thyroid imaging research has a well-established international collaboration network.

These findings indicate that research collaborations in thyroid imaging are concentrated around specific academic hubs and play a crucial role in scientific productivity in this field.

Analysis of Author Collaborations in Thyroid Imaging Research

Thyroid imaging articles indexed in the Web of Science database were analyzed to evaluate author collaboration networks. The results are detailed in **Figure 5**.

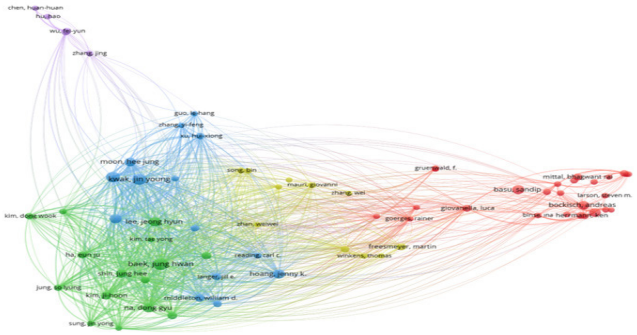

Figure 5. Bibliometric network map of author collaboration (the size of the circles represents the main authors, while the lines between the circles indicate collaboration relationships.)

Figure 5 presents the bibliographic connections among authors who have published at least 10 articles in this research area. A total of 71 authors were evaluated, but only those meeting the threshold were included in the final analysis.

Setting a minimum publication threshold of 10 articles ensures that only highly productive and influential researchers are considered. This approach enhances the reliability and academic significance of the analysis by focusing on active and impactful contributors in thyroid imaging research.

The figure visualizes collaboration networks among thyroid imaging researchers. Each author is represented by a circle, where the size of the circle reflects their contribution to the literature. The lines connecting the circles indicate collaboration strength and bibliographic linkages. The visualization was generated using VOSviewer, with different colors representing distinct research groups and thematic collaborations.

- Blue cluster: Researchers such as Kwak Jin Young and Moon Hee Jung are centrally positioned, forming strong collaboration networks. This cluster is primarily focused on ultrasound and nodule evaluation.
- Green cluster: Researchers like Baek Jung Hwan, Na Dong Gyu, and Kim Tae Yong have wide collaboration networks, mainly contributing to studies on thyroid nodule evaluation and malignancy classification.
- Red cluster: Authors such as Bockisch Andreas, Mittal Bhagwant Rai, and Giovanella Luca lead this group, which is strongly associated with nuclear medicine and PET/CT-based thyroid imaging.
- Yellow cluster: Includes authors like Giovanni Mauri and Zhang Wei, who focus primarily on thyroid biopsy techniques and interventional imaging.

- Purple cluster: Comprises Wu Fei-Yun and Zhang Jing, representing a smaller network focused on regional or specific subfields.

Overall, collaboration networks in thyroid imaging research are structured around regional and methodological similarities, reflecting the interdisciplinary nature of the field and the core dynamics of research collaborations.

Country-Based Citation Distribution

The citation distribution of thyroid imaging articles across countries was analyzed using the Web of Science (WoS) database. The results are visually represented in **Figure 6**, illustrating the geographical spread of citations, regional research density, and international academic collaborations.

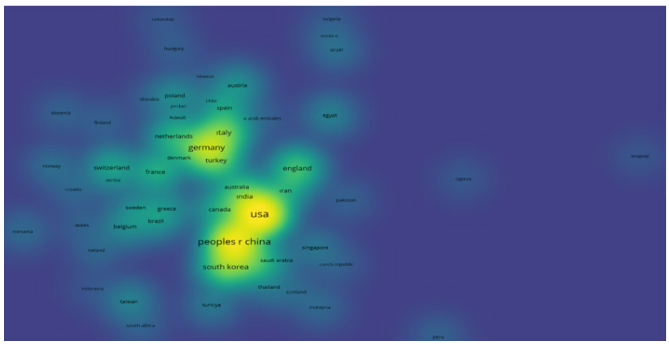

Figure 6. Analysis of citation distribution by country

Figure 6 presents the country-level distribution of citations and the global academic collaboration network based on articles indexed in Web of Science. The analysis considered countries with at least five published articles, and among the 90 eligible countries, 58 were included in the final evaluation.

The United States and China emerged as the countries with the highest citation intensity, indicating that research groups in these nations have made significant contributions to thyroid imaging and hold widespread influence in the academic community.

Other high-impact countries include:

- South Korea, Germany, and the United Kingdom, which exhibit strong scientific output in thyroid imaging research.
- Germany, Italy, France, and the Netherlands demonstrate strong regional collaborations within Europe.
- Turkey and Iran contribute to the citation network by engaging in regional academic collaborations.

Overall, Figure 6 reflects the global distribution of academic impact in thyroid imaging, providing insights into international collaborations and potential research opportunities within the field.

DISCUSSION

This bibliometric analysis provides an update on the imaging of the thyroid within the category of radiology by presenting collaborative networks, research trends, and influential studies. After performing the analysis, we compare the results from our study in contrast to previously conducted bibliometric studies on thyroid US and thyroid imaging related research and realize important differences and similarities are present which tell this field's life cycle and its current status.

There are several past studies that have conducted the bibliometric imaging trends analysis for US and thyroid cancer research. As an example of this approach, Su et al.[5] conducted an analysis on the publication records of thyroid US studies and noted the increasing assertiveness of ultrasound-validated studies in this specialty. To follow, similarly to Tang et al.[8] who performed a bibliometric analysis of ultrasound-guided ablation of thyroid nodules, there is an explosive increase of interest in interventional ultrasound studies. These studies, which claim that ultrasound is the foremost imaging technique utilized in thyroid imaging, are also supported by our analysis as the publications we reviewed contained the terms u "thyroid ultrasound," "thyroid nodule," and "US."

Zhang et al.[9] conducted a bibliometric analysis of publications to track the advancements in the diagnostics and therapeutics of thyroid nodules through imaging. Although they considered a wider scope which included other endocrine studies, our study is focused on thyroid imaging within radiology, which provides us the opportunity to analyze the imaging modalities used and the trends in publication and citations for this specific area. Our results prove that thyroid nodules remain a topic of interest for many high impact publications that seek to evaluate graduate's imaging techniques for malignancy risk assessment.

Wu et al.[7] looked at bibliometric data for research on thyroid cancer and reported that the past two decades have shown a dramatic increase in research productivity in the field. Emphasis is placed on diagnostic imaging in the form of PET/CT and MRI as important tools for thyroid cancer detection and staging. A contrasting view was reached that while there are some specific cases where PET/CT and MRI are applicable, ultrasound is the foremost imaging technique for thyroid patients for radiology research. These differences stem from the concern of thyroid diseases as a cross-scientific field ie. radiology oncology and endocrinology, which is why our study differed from Wu and Zhou's.

Liu et al.[6] conducted a bibliometric study on the role of FNA in the diagnosis of thyroid nodules, detailing its important diagnostic feature within the research scope of FNA. Our findings complement this by demonstrating that other landmark studies in thyroid imaging utilize FNA along with ultrasound which further emphasizes the role of ultrasound guided procedures in thyroid disease diagnosis. It is consistent with prior literature advocating the dual application of imaging and biopsy techniques for greater diagnostic precision.

In most bibliometric studies, the scope of focus was peripheral. In contrast, our study focuses on the specialty area of thyroid imaging as a separate branch of radiology which makes it possible to analyze the publication activity, the principal stakeholders, and the degree of inter-institutional collaboration in more detail. This focus on only radiology journals sets this work apart from more advanced studies that concentrate on endocrinology, oncology, and other related subjects making the analysis useful for practicing radiologists and imaging scientists.

But there is a caveat to this study as is in many other bibliometric works which is, selectivity of the databases.[10,11] Web of Science is excellent for baseline bibliometric analyses but other databases like Scopus or PubMed have much more to offer. Subsequent work that uses multiple databases may shed much needed light on how thyroid imaging is studied around the world.

Our research shows that the thyroid imaging domain has evolved continuously with a big growth in publications in the last ten years.[12] The increasing use of US indicates its being the primary method of imaging the thyroid. However, growing interest in PET/CT and MRI suggests that advanced imaging services may be offered in the future for thyroid diseases.

Further studies should be directed towards the application of artificial intelligence (AI) in the thyroid imaging, as automatic diagnostic devices are being developed for medical imaging. Moreover, extending bibliometric studies to evaluate the association of new imaging markers and radiomics with thyroid diseases would mark a new era in research in this specialty.

Limitations

The investigation was limited to the Web of Science database which, though sturdy, does not include all relevant resources published in Scopus, PubMed or Google Scholar. There is also the issue that citation count does not always match research quality, as some newer studies have not been cited much but are promising in terms of their impact.

CONCLUSION

This study identified the most influential publications and authors in the field of thyroid imaging within radiology, providing a comprehensive overview of research trends. The findings confirm that ultrasound remains the primary imaging modality for thyroid evaluation, while PET/CT and MRI are gaining importance in specific clinical scenarios. Unlike previous bibliometric analyses, this study explores radiology citation networks in greater detail, highlighting key research clusters and publication patterns.

The increasing number of radiology publications in recent years reflects growing academic interest, driven by technological advancements and evolving clinical needs. Future research should focus on integrating AI and radiomics into thyroid imaging to enhance diagnostic accuracy and clinical decision-making. As imaging technologies continue to advance, interdisciplinary collaboration will play a crucial role in shaping the future of thyroid imaging research.

ETHICAL DECLARATIONS

Ethics Committee Approval

Since the study was a bibliometric analysis, ethical approval was not obtained.

Informed Consent

Since the study was a bibliometric analysis, informed consent was not obtained.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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